

**BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, DC 20554**

In the Matter of)	
)	WC Dkt. No. 13-39
Rural Call Completion)	

**COMMENTS OF HYPERCUBE TELECOM, LLC ON
FURTHER NOTICE OF PROPOSED RULEMAKING**

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EXECUTIVE SUMMARY

HyperCube Telecom, LLC (“HyperCube”) emphasizes in these comments the need for the Commission to implement an additional pragmatic, pro-competitive “Safe Harbor” relaxing otherwise-applicable data collection and reporting obligations. As shown in these comments, it is the nature of the services provided, not the number of providers in the call flow, that determines the likelihood of rural call completion problems.

The existing “Managing Intermediate Provider Safe Harbor,” however, effectively forecloses participants from employing advanced competitive network traffic routing arrangements while failing to address unauthorized routing arrangements directly. Moreover, this Safe Harbor is also anticompetitive, favoring large incumbent local exchange carriers over other providers and denying providers and consumers the benefits of a competitive market. It would ultimately discourage the existence of multiple economic network options such as those made available through Least-Cost Routers and call-flows using services of multiple intermediate providers, and it would thereby be detrimental to overall network resilience in the United States.

HyperCube’s independent analysis of certain traffic data and its cooperation with other providers in the call flows demonstrated, however, that it is a relatively straightforward process for cooperating providers to determine whether a call completion problem is the result of a “bad hop” – an unauthorized traffic routing arrangement – or the result of the need for augmentation of the terminating provider’s network facilities.

HyperCube therefore urges the Commission to adopt an additional, pro-active and pro-competitive Safe Harbor that would help alleviate the burdens of the current data collection and

reporting obligations for providers that participate in a cooperative industry program to identify and ameliorate call completion problems in real time.

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HyperCube Telecom, LLC (“HyperCube”) files these comments in response to the Further Notice of Proposed Rulemaking¹ (“FNPRM”) of the Federal Communications Commission (“FCC” or “Commission”) seeking comment on additional proposals to improve the rate and efficiency of call completion for calls terminating in rural areas. These comments emphasize the need for the Commission to implement an additional pragmatic, pro-competitive “Safe Harbor.” This additional Safe Harbor would relieve participating providers of the extensive recordkeeping and reporting obligations adopted in the initial Order addressing rural call completion concerns in exchange for the participants’ commitment to and active participation in cooperative efforts to address relevant rural call completion problems as soon as they are identified.

¹ *In the Matter of Rural Call Completion, Report and Order and Further Notice of Proposed Rulemaking*, WC Docket No. 13-39, FCC 13-135 (rel. Nov. 8, 2013) (hereinafter the *Further Notice of Proposed Rulemaking* portion of the item is referred to as the “FNPRM,” and the *Report and Order* is referred to as the “Order”).

I. INTRODUCTION AND OVERVIEW

HyperCube is a certificated carrier that is a premier provider of wholesale local and national tandem switching² and transport services – including switching, transport, signaling, database queries, and media conversion – using a next-generation infrastructure that HyperCube makes available to the entire spectrum of traditional and next-generation service providers, including wireless carriers, wireline competitive local exchange carriers and incumbent local exchange carriers (“CLECs” and “ILECs,” respectively), interexchange carriers (“IXCs”), cable telephony providers, and Voice over Internet Protocol (“VoIP”) providers. HyperCube’s services support both Time-Division Multiplexing (“TDM”) and Internet Protocol (“IP”) interconnection, allowing HyperCube to bridge emerging and traditional networks so that all service providers can seamlessly interconnect their respective networks and exchange traffic with one another, as well as complete calls more effectively and efficiently.³ In this role, HyperCube is directly involved in virtually all permutations of the universe of call flow arrangements, including those involving rural local exchange carriers (“RLECs”).

HyperCube has been an active participant in the Commission’s efforts to address call completion problems arising in rural areas.⁴ In these comments, HyperCube discusses the

² HyperCube is an alternative tandem provider whose switches are included in the Local Exchange Routing Guide (LERGTM), providing both traditional and non-traditional interconnections.

³ HyperCube is thus both an alternative tandem common carrier in the TDM environment and an intermediate provider in the IP environment. For convenience, to encompass both roles, HyperCube is hereinafter referred to as an “intermediate services provider.”

⁴ In addition to filing both initial comments (Comments of HyperCube (May 13, 2013) (“*HyperCube Comments*”)) and reply comments (Reply Comments of HyperCube (Jun. 11, 2013) (“*HyperCube Reply Comments*”)) in this docket, in July 2013 HyperCube met with Commission staff to discuss ways in which rural call completion problems can be quickly ameliorated when service providers involved in a call path cooperate to resolve them. *See*

rationale for and benefits of its proposed pro-active, cooperative approach to resolution of rural call completion problems. HyperCube further recommends that this solution be adopted as an additional Safe Harbor for participating providers that, like the existing “Managing⁵ Intermediate Provider Safe Harbor,”⁶ would relax the data collection and reporting requirements adopted in the Order for participating providers.⁷ HyperCube’s proposal is a targeted approach that directly and immediately addresses specific call completion problems as they arise. Moreover, its adoption would reduce the substantial anticompetitive effects of the Safe Harbor approach

HyperCube, *Notice of Ex Parte Meeting* (Jul. 22, 2013) (“*HyperCube July 22, 2013, Ex Parte*”). HyperCube’s study was precipitated by a meeting with Pennsylvania RLECs that revealed a significant discrepancy between wholesale rates for toll termination into the RLECs’ networks (as updated and provided by various vendors in their “rate decks”) and the tariffed access rates of the RLECs. *HyperCube July 22, 2013, Ex Parte*, Slide 1. HyperCube subsequently submitted a written presentation explaining how such a cooperative solution would work. HyperCube, *Written Ex Parte Presentation* (Oct. 22, 2013) (“*HyperCube October 22, 2013, Ex Parte*”). Following HyperCube’s July meeting with FCC staff, the Association for Telecommunications Industry Solutions (“ATIS”) and the National Exchange Carriers Association (“NECA”) announced a “voluntary testing project aimed at identifying call completion issues.” *Press Release*, ATIS and NECA, ATIS and NECA Join Forces to Help Address Call Completion Issues (Aug. 23, 2013), <http://www.atis.org/PRESS/pressreleases2013/082313.asp> (last visited Jan. 16, 2014); *see also Order* at ¶ 12 n.39.

⁵ In fact, this Safe Harbor should be called the “Limiting Intermediate Provider Safe Harbor,” because, rather than requiring *management* of intermediate providers, the existing Safe Harbor instead *limits the number* of intermediate providers (and thereby discourages the use of competitive alternatives along the call path).

⁶ *Order* at ¶ 86 (describing this Safe Harbor as satisfied when a provider annually certifies “either that it uses no intermediate providers, or that all of its contracts with directly connected intermediate providers allow those intermediate providers to pass a call to no more than one additional intermediate provider (that is, a total of no more than two intermediate providers in the call path) before the call reaches the terminating provider or terminating tandem;” “that any nondisclosure agreement with an intermediate provider permits the covered provider to reveal the identity of the directly connected intermediate provider and any additional intermediate provider to the Commission and to the rural carrier(s) whose incoming long-distance calls are affected by intermediate provider performance;” and that if the provider “uses intermediate providers, it has a process in place to monitor the performance of its intermediate providers.”).

⁷ *See HyperCube October 22, 2013, Ex Parte*.

adopted in the Order,⁸ which has the unintended consequence of promoting the commercial interests of the large ILECs to the detriment of other carriers.

II. THE NATURE OF THE SERVICES PROVIDED, NOT THE NUMBER OF INTERMEDIATE PROVIDERS IN THE CALL FLOW, DETERMINES THE LIKELIHOOD OF CALL COMPLETION PROBLEMS

The existing Safe Harbor approach allows service providers covered by the data collection and reporting requirements⁹ (because they control the long distance routing for a significant amount of traffic) (hereinafter, “originating providers”)¹⁰ to avoid certain data collection and reporting obligations¹¹ if they either use no intermediate providers or require the intermediate providers to which they hand off long distance traffic to have no more than one additional intermediate provider in the call flow before the terminating provider or tandem.

⁸ This Safe Harbor arbitrarily limits the number of intermediate providers in a call path, and it can deprive both originating and intermediate providers of alternative, effective routing arrangements. *See* discussion *infra* Section III.B.

⁹ The rules apply to “providers of long-distance voice service that make the initial long-distance call path choice for more than 100,000 domestic retail subscriber lines, counting the total of all business and residential fixed subscriber lines and mobile phones and aggregated over all of the providers’ affiliates.” *Order* at ¶ 19. Under the current rules, “covered providers” include LECs, IXC, commercial mobile radio service providers, and VoIP (including interconnected and one-way VoIP) service providers, but not intermediate carriers. *Id.* & n.56.

¹⁰ This is also the Commission’s usage. *Order* at ¶ 20 n.57.

¹¹ These requirements include: (1) recording and retaining various call detail information for each long-distance call attempt; (2) a six-month period to retain call detail records in a readily retrievable form; and (3) required filing of certified reports to the Commission on a quarterly basis. *See Order*, Section III.A. Compliance requires providers to devote substantial financial and human resources to data collection and report preparation that, in HyperCube’s view, could be more productively devoted to direct responses to identified rural call completion problems. Moreover, these reporting obligations raise competitive concerns about the security of proprietary information submitted to the Commission and potentially shared with third parties, including state regulatory authorities that may not have the same confidentiality procedures as the Commission.

Unfortunately, however, this Safe Harbor is based on the erroneous belief that it is the number of hand-offs between the originating provider and the terminating RLEC that determines the likelihood of rural call completion problems, and on whether the originating and intermediate providers are affiliated or unaffiliated. (These comments, therefore, use the neutral term “hops” to refer to all hand-offs.¹²)

The number of providers in the call flow is *not* a proxy for the quality of the call flow. The correlation between multiple hops and some call completion problems does not mean that there is a causal relationship between them. Rather, it is the nature of the services provided by each provider, not the number of intermediate providers, that determines the likelihood of effective call completion. When the goal of all providers in the call flow is to achieve a P.01 Network Effectiveness Ratio (“NER”),¹³ all consumers, including those living in rural areas, will

¹² A “hop” is a hand-off. This neutral term is used because it does not distinguish among hand-offs according to whether a hand-off is between affiliated or unaffiliated providers; indeed, in today’s network a hand-off may not even be tied to physical devices. As discussed *infra* in this Section II, however, a single provider can in fact provide multiple hops. Equating the number of unaffiliated providers with the number of hops is yet another way in which the existing Safe Harbor favors the largest ILECs over other providers, and allows them to continue to reduce innovation and competition.

¹³ “P.01” is the traditional standard for quality traffic delivery, dating to the days of the Bell System, and remains applicable today to ensure the call quality that consumers are used to and expect. The P.01 Grade of Service standard establishes that there should be no more than one failed call per 100 attempted calls. The NER, a term defined by the ITU in ITU-T Recommendation E.425, is used to measure call completion rates. Busy signals and other effects of user and terminal behavior are excluded in calculating the NER. The formula for calculating the NER is:

$$\text{NER} = 100 \frac{\text{Answered Calls} + \text{User Busy} + \text{Ring No Answer} + \text{Terminal Reject}}{\text{Seizures}}$$

In contrast to the NER, the Commission’s “answered call attempt” metric does not exclude items such as the called number’s being busy or other terminal behavior outside the control of the

receive the high quality service they expect and deserve. A hop between an originating provider and one of its affiliates is still a hop, and there is no global reason to assume that hops between affiliates pose a lesser risk of call completion problems than hand-offs between unaffiliated providers. Rather, it is the call-delivery quality standard to which the various providers in the call flow – affiliated or unaffiliated – are committed that determines call completion performance.

A. Historical Call Delivery Call Flows

A brief look back at the delivery of calls within the Bell System demonstrates the wide variation in “hops.” For example, in the MF (multi-frequency) signaling environment that still exists in a few places today, a hop is each switch. It is quite easy to understand the concept of hops within this context as each central office or tandem office is a hop. The signaling and the voice traffic travel along the same routes and network paths:

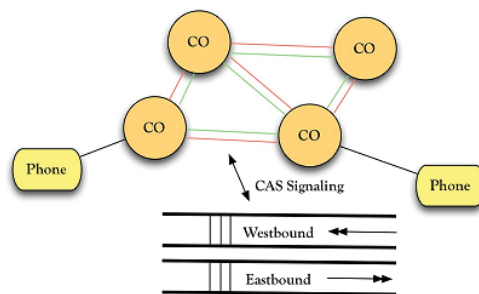


Figure 1- CAS¹⁴/ MF Network – Simplified

originating provider. *Order* at ¶ 72 (“‘answered call’ means a call that was answered by or on behalf of the called party (including calls completed to devices, services or parties that answer the call such as an interactive voice response, answering service, voicemail or call-forwarding system), causing the network to register that the terminating party is prepared to receive information from the calling user.”).

¹⁴ “CAS” is the acronym for “Channel Associated Signaling,” also known as “Per Trunk Signaling” (“PTS”). It has been replaced in more modern networks by “CCS” (“Common Channel Signaling”).

In the SS7 network, however, a hop could mean many things - it could be the SSPs (Service Switching Points), the STPs (Signal Transfer Points), or the voice network itself (because the voice portion of the call rarely follows that of the signaling, and in fact almost never does):

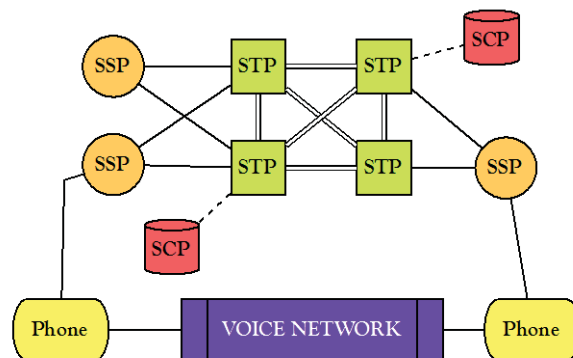


Figure 2 - SS7 Network – Simplified

In this simplified example, SSPs are switches, for example, Class 5 (local) and Class 4 (tandem) with SS7 interfaces. SSPs convert global title digits (*i.e.*, a dialed number) from a subscriber line to SS7 signaling messages.¹⁵ There are three call set-up scenarios an SSP will encounter that may (or may not) create additional “hops.”¹⁶ In the typical rural routing scenario (n.16, Scenario

¹⁵ An SSP's function is to use a global title to determine how to connect a call using its routing table. SSPs set up, manage, and release voice circuits required to make a call. SSPs send messages using the ISDN User Part (ISUP) and Transaction Capabilities Application Part (TCAP) protocols.

¹⁶ The three scenarios are:

- a. A call originates and terminates at the same switch (same SSP): No signaling messages are sent through the SS7 network. The SSP knows exactly where the destination is.
- b. A call originates at an SSP and is destined for a known SSP: In this case the originating SSP looks at its routing table to determine how to route the call and then sends a message to the destination SSP using the ISUP protocol. This typically will happen only with Fully Associated (F) links.
- c. A call originates at an SSP and is destined for an unknown SSP: In this case there are two possible scenarios:

c.ii), a call originates at an SSP and is destined for an unknown SSP. The SSP routing table yields the address of an SSP (a next-hop SSP) and the Call Set-up Sequence message (the IAM) is sent, via an STP, to this SSP, which in turn will route the message to the next hop, and so on until the message reaches the destination SSP.

Thus, in the past, while all the hops in the call flow typically were performed by various Bell affiliates, delivery of a long distance call took four or more hops. Even today, a single provider, such as a vertically-aligned ILEC, may in fact use multiple hops to carry a call, and the length of time to complete a call is not driven by whether hops are between affiliates or non-affiliated providers.¹⁷

-
- i. The global title (called the “part number”) may be an 800 or a ported number. In this case the originating SSP performs a TCAP transaction with Global Title Translation via an STP to determine the point code of the destination SCP (Service Control Point). The SCP will return a new Global Title. The originating SSP uses this number to route the call.
 - ii. The SSP routing table yields the address of an SSP (a next-hop SSP) and the Call Set-up Sequence message (the IAM) is sent, via an STP, to this SSP, which in turn will route the message to the next hop, and so on until the message reaches the destination SSP. *This is the typical rural calling process.*

¹⁷ HyperCube therefore respectfully disagrees with the Commission’s decision to treat hops between a provider and its affiliate as not involving an intermediate provider. *Cf. Order* at ¶ 24. This approach, which gives an unjustified competitive advantage to the largest vertically-aligned carriers with many affiliates, is not supported by evidence that hops between affiliates pose fewer risks of call completion problems than hops to unaffiliated intermediate providers. Indeed, while contracts between originating providers and unaffiliated intermediates may include call completion performance metrics and penalties, there is no evidence that such standards apply to hops between affiliated providers. Moreover, highly vertically integrated providers also may be further advantaged by the new rules because these providers would not have to report hops to their affiliates as hops to intermediate providers, and because it thus may be no burden on these providers to certify that they use no intermediate providers if all their hops are only to affiliates with direct interconnections with one or more terminating providers, or to the terminating providers themselves. Thus, these large carriers could qualify for the Safe Harbor without revising their existing routing arrangements.

B. Call Delivery Today – Distinguishing “Bad Hops” from “Good Hops”

In today’s networks, the concept of “hops” is not necessarily tied to physical devices or to particular intermediate routes. There is no specific guarantee that signaling and voice traffic between the same origination and end points will follow the same paths or traverse the same devices. In fact, through today’s dynamic network routing, it is possible that the calls (*i.e.*, “media”) and associated signaling between the same origination and end points may follow different paths and therefore may, from call to call between the same origination and end points, encounter different numbers of hops. Further, by using a redirect message, the voice path may be directed to one of multiple locations. Figures 3 and 4 diagram alternative possible routings.

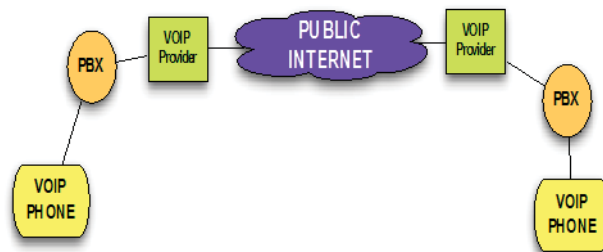


Figure 3 - Simplified VoIP-Only Network

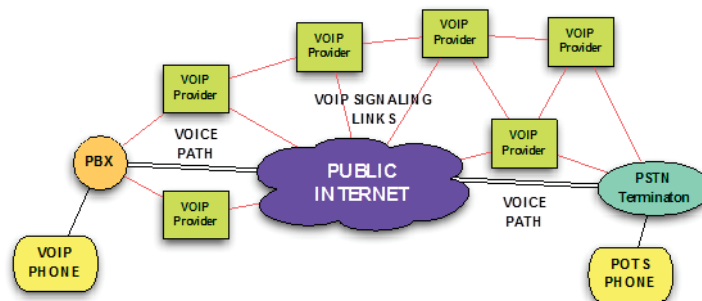


Figure 4 - VoIP Network with Multiple Hops but a Single Voice Path

Thus, the number of providers in a call path is typically unrelated to the number of hops in the call path and is, of course, transparent to end-users. While in today's competitive marketplace multiple providers may perform the functions formerly provided by Bell affiliates, the vast majority of calls continue to be delivered seamlessly, effectively, and efficiently when all providers in the call flow adhere to industry best practices.

As seen by HyperCube in its study results, a few providers, who deploy unauthorized types of equipment or clandestine interconnection arrangements which may flout the tariff rules and business practices of the terminating LEC, create many bad hops and thereby contribute disproportionately to call completion problems.¹⁸ Such unauthorized, off-tariff re-origination schemes typically have insufficient capacity for the traffic they attract and cannot deliver the call quality or call completion rates expected by consumers or promised to upstream providers.¹⁹ The detection and elimination of such schemes through joint efforts between cooperating providers is key to restoring call completion performance to P.01 levels. By distinguishing "bad hops" from "good hops," and eliminating the "bad hops,"²⁰ cooperating providers in the call path can ensure that identified call completion problems are addressed and resolved promptly.

"Bad hops" may include situations in which entities use unconventional, low-quality, or limited-capacity arrangements or rely on local interconnection arrangements to complete toll

¹⁸ This assumes, of course, that there are adequate terminating carrier facilities to deliver calls to customers and that terminating carriers are committed to augmenting their facilities in response to increased traffic demands.

¹⁹ It behooves each provider to agree on and obligate its trading partners to adhere to specific standards of call quality, route management, and other network-controllable functions based on commercial agreements.

²⁰ See, e.g., *Order*, ¶¶ 30 n.92, 79 n.215 (recognizing HyperCube's concern regarding "bad hops").

calls. In other cases, consumer-based connection arrangements, which are traditionally designed for simple call handling, are being used for interconnections.²¹ For example, “bad actors” can attach a SIM box²² to a wireless network in order to terminate calls to a specific RLEC, substituting an unauthorized, lower cost arrangement (a non-traditional and unwanted route not designed for this traffic) for the applicable higher-cost, tariffed interconnection charge route.

Figure 5 diagrams a scenario in which there is a bad hop at the edge of a VoIP network.

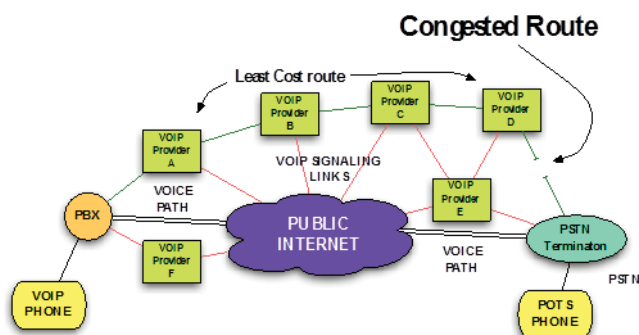


Figure 5 – Showing a Bad Hop Located Along a Least Cost Route

Significantly, while bad hops can occur anywhere along the path – including that of a non-least cost route – one of the most common bad hop situations HyperCube has uncovered is where the

²¹ The *HyperCube July 22, 2013, Ex Parte* and Attachment 1 (Case Study No. 6) provide examples of a variety of “bad hop” arrangements. (Attachment 1 reflects an additional scenario investigated by HyperCube that was included in HyperCube’s presentation at the Comptel Plus meeting. See Doug Davis, CTO, HyperCube, Presentation during the *Rural Call Completion: Getting to the “Answer”* Panel at the Comptel Plus Fall 2013 Convention & Expo (Sept. 25, 2013)).

²² A SIM (Subscriber Identity Card Module) box, or GSM gateway, is essentially a box containing multiple phones on different networks, so that when a call comes in from one network intended for another, the box re-originates the call through the box’s phone on the other network, and the receiving network does not know that the call originated on a different network and that it should be paid compensation for terminating the call. In addition to denying operators compensation to which they are entitled, the use of the boxes often leads to poor call quality, because of the concentration of modems and SIM boxes in one location. Caller ID and other features also may be eliminated if SIM boxes are used.

problem link is nearer the termination side than the origination side.²³ In this situation “VoIP provider D” should be obligated to release the call back (what is known as a “503”) to “VoIP provider C,” or to redirect the call to “VoIP provider F,” which may have a less congested route, rather than delay the call, provide false signaling, or “404” (drop the call).

Based on HyperCube’s study, resource-constrained RLEC networks find it difficult to promptly detect SIM boxes or similar unauthorized interconnection arrangements²⁴ on their own. Thus, the likelihood of call completion problems increases when the volume of traffic using the unauthorized route expands dramatically and exceeds, for example, the SIM box capacity, and RLECs lose substantial revenues to which they are entitled.²⁵

²³ Thus, even if an originating provider takes advantage of the Safe Harbor by requiring the provider to which it makes a hand-off to commit to no more than one more hand-off, given that the choke point is most likely near the end of the path, this restriction in the *number* of hops is unlikely to make any difference in call completion rates. Even a former RBOC making only one hand-off to a non-affiliate could select such a problematic routing hop as its permitted non-affiliate hop, and the call completion rate would be no different than if there had been multiple unaffiliated intermediate providers in the call path. (Similarly, if the call completion problem is due to insufficient facilities at the terminating end, limiting the number of intermediate providers would not provide any benefits, although an augmentation through a new direct interconnection arrangement with an additional provider would alleviate the problem and produce additional pro-competitive benefits. See discussion *infra* at 16-20. Again, the nature of the hops, not their number, is what really matters. Thus, adherence to the strictures of the existing Safe Harbor would produce no reduction in rural call completion rates, but would nonetheless provide a substantial anticompetitive advantage to the largest carriers, with both short- and long-term adverse effects on pricing and innovation for consumers. The Commission’s focus should be only on eliminating bad hops, not on anticompetitively limiting the number of hops regardless of quality.

²⁴ Other unauthorized routing arrangements involve the use of a cable company’s own cable modems. See Case Study No. 2, where the RLEC found an unauthorized route using a cable modem, and the problem was resolved when the modem was removed. *HyperCube July 22 Ex Parte*, Slide 4. Another common type of unauthorized routing arrangement uses PRI (Primary Rate Interface) T-1 trunks intended for business consumers in lieu of access trunks for terminating long distance traffic.

²⁵ See HyperCube’s Case Study No. 5, involving a Tier 1 wireless carrier in a rural area. *HyperCube July 22, 2013, Ex Parte*, Slide 7. Other scenarios identified by HyperCube include

HyperCube therefore endeavored to identify some rural call completion problems through a traffic study. Unauthorized arrangements were discovered when HyperCube found that there were certain heavily used traffic routes appearing in its Least Cost Routing (“LCR”) database that were offering suspiciously low below-tariff termination rates when reviewed in the context of otherwise applicable RLEC termination charges. By alerting the RLECs at the terminating end of the calls, HyperCube was able to determine that in one case an Internet “back-door” termination arrangement was in place.²⁶ In another case, involving an RLEC on a tribal reservation, when HyperCube contacted an affected RLEC, that RLEC discovered an intermediate carrier whose LCR set-up was deficient since it was routing against another LEC’s LRN (Local Routing Number), and that other LEC was rejecting many calls due to capacity limitations. Once the intermediate carrier’s LCR and routing were fixed, the vendor rates aligned with the RLEC’s tariff rates, and call completion began meeting the P.01 quality objective.²⁷ In sum, most of the RLECs, when contacted by HyperCube, were able to identify and shut off the impermissible routings, eliminating the call completion problems promptly.²⁸

Case Study No. 4, in which the problem was attributable to “split-fill” routing (that is, to a company’s sending some calls down multiple routes, one of which is congested (for whatever reason)). See *HyperCube July 22, 2013, Ex Parte*, Slide 6.

²⁶ See Attachment 1.

²⁷ See *HyperCube July 22, 2013, Ex Parte*, Slide 5.

²⁸ In some cases the problem was at least partially attributable to the need for augmentation of the RLECs’ facilities at the terminating end. In those situations, the RLECs did not respond to HyperCube’s inquiries. An unmet need for augmented facilities could arise, for example, in a situation in which an RLEC uses a tandem provider pursuant to a contract that offers a specified rate for a specific set of facilities. If the required facilities would exceed the allowed number, the RLEC may be reluctant to make the investment in the additional facilities because the additional cost for the tandem service would be prohibitive, which could lead to overflow situations in which customers experienced call completion problems. Due to the proliferation of calling

Based on HyperCube’s experience and research, bad hops typically have capacity issues and performance problems or enter and exit some networks in areas or ways the network managers and designers never intended. In contrast, the good hops typically have proper documentation, proper arrangements,²⁹ and good communications between the trading partners.³⁰ The call completion problem is not the result of having multiple providers in the call flow or of using LCR arrangements.³¹

services with “free” or “bucket” rate plans, high cost areas may now be receiving greatly increased call volumes.

²⁹ For example, an intermediate provider may offer a lower-cost solution for terminating traffic with a given RLEC because it has a direct interconnection arrangement with the RLEC and both parties find a below-tariff interconnection rate to make economic sense in this context. Such agreements can include performance metrics and quality standards. A third party provider may then use LCR technology to identify this lower-cost route, benefiting its customers. Such an arrangement has rates lower than the otherwise applicable tariffed rates, but this represents economic bypass, and it affords a competitive benefit to all parties so long as the RLEC accommodates direct connections whenever economically justifiable irrespective of the intermediate provider. As discussed in Section III.B, *infra*, direct interconnection arrangements should be encouraged where traffic volumes warrant, and they afford an opportunity to ameliorate rural call completion problems resulting from insufficient facilities that can clog an existing route. (An unauthorized arrangement, in contrast, is not mutually beneficial to the providers, and it will feature otherwise inexplicably low rates.) By effectively preempting the opportunity for originating providers to take advantage of legitimate cost-based lower-rate options, the existing Safe Harbor imposes unnecessary costs on them and their customers, and limits market choices. Furthermore, if additional facilities are required to achieve proper interconnection because the issue in the call flow is the capacity of the tandem-to-RLEC routing, augmentation should not be deemed burdensome. An augment will clear this issue, as would a second interconnection with another provider. If that “other” company is willing to foot the transport bill, the costs to the RLEC are similar, but a second interconnection also affords additional route diversity.

³⁰ A hop (which in reality today represents a traffic-trading arrangement) can be measured and performance metrics (and penalties) applied. In contrast to the “bad actors” willing to clandestinely employ impermissible routing arrangements to reap high volume-based revenues until their anomalous routings are discovered and shut down, intermediate providers such as HyperCube are committed to the goal of providing P.01 service and rely on access trunks and comparable facilities, rather than illegitimate routing arrangements. Such providers use both advanced, high quality LCR tools and direct interconnection arrangements to ensure efficient, high quality service. When particular routes experience call delivery problems, these providers’

HyperCube's investigation also helps demonstrate that each destination OCN (Operating Company Number) should be treated as a unique situation. However, as HyperCube has found, if providers cooperate, it is actually a fairly straightforward process to identify the probable causes of a specific call completion problem,³² usually illegitimate service offerings that offer low rates that would not be possible absent the impermissible nature of the routings. Such routings deprive resource-challenged RLECs of revenues essential to the continuation of high quality service, and they discourage the establishment of more reliable direct interconnection arrangements between RLECs and legitimate intermediate providers. HyperCube therefore

network designs enable them to use alternative routings and avoid loop-back situations or those in which calls go undelivered. (A "loop-back" situation is one in which an intermediate carrier sends a call to a terminating provider that, rather than terminating the call, returns it to the originating provider or another third party provider who then returns the call to an upstream provider.) HyperCube submits that loop detection software must be used in conjunction with any LCR activity and that a provider finding that it has no available terminating route should return the call to the originating provider within a short period of time to avoid post-dial delay issues. In the case of unauthorized arrangements, however, a call is more likely to be dropped or blocked than returned to the originating provider.

³¹ The appropriate use of LCR arrangements promotes efficient cost-based interconnection and call termination in a competitive market. Where traffic volumes warrant, RLECs can enter into equitable direct interconnection arrangements with individual carriers at below-tariff rates that are mutually beneficial to both intermediate and terminating providers. This gives consumers the benefits of lower rates, while ensuring adequate, cost-based compensation to providers for their services.

³² The anomalous situations, however, will not be automatically caught statistically, because they are hidden too deeply. Only because HyperCube undertook a specific study in an effort to better understand the various sources of call completion issues was HyperCube able to identify the described scenarios for future study, and resolving them required cooperative efforts. Bad hops can only be caught by the operators themselves. As discussed with Commission staff, the level of understanding of the relevant circumstances depends on the level of attention and cooperation provided by the parties whose networks the calls traversed. See *HyperCube July 22, 2013, Ex Parte*, at 1. Under HyperCube's proposal, RLECs would identify where problems were occurring, and providers participating in the call flows would cooperate in trying to identify and rectify the specific problems. See also ATIS, *Intercarrier Call Completion/Call Termination Handbook* (2012) (*ATIS Handbook*), available at <https://www.atis.org/docstore/product.aspx?id=26780> (last visited Jan. 16, 2014).

encourages the Commission to implement policies, such as the additional Safe Harbor proposed in these comments, that directly attack the roots of the call completion problem.

III. THE EXISTING SAFE HARBOR EFFECTIVELY FORECLOSES ECONOMIC AND EFFICIENT TRAFFIC ROUTINGS AND IS ANTICOMPETITIVE.

A. Limiting the Number of Intermediate Providers Would Result in Poor Traffic Control.

There is a danger when broad or imprecise terminology, while simple to apply, is over-inclusive and thereby encompasses both problematic and non-problematic situations. For example, “traffic control” and “traffic management,” which are common advanced features of modern networks, are different from the prohibited practice of “call blocking;” confusion between such legitimate advanced features and the prohibited practice could wreak havoc in networks and result in broader call completion problems. Without traffic-stream adjustment using common network-routing techniques such as Automatic Call Gapping (“ACG”), heavy call volumes resulting from consumer voting during television and radio contests or audience-response programs (such as “American Idol”) could overload networks and cause calls to be disconnected or not completed. Network investments to accommodate traffic-volume spikes during such events would not be economic.

Similarly, rules or Commission-endorsed practices that ultimately discourage the existence of multiple economic network options such as those made available through LCRs and call-flows using multiple intermediate providers would be highly detrimental to overall network resilience in the United States. Implementation of the existing Safe Harbor unnecessarily deprives providers of the use of many effective, efficient routing arrangements and creates a perverse incentive for “bad actors” to devise new schemes to circumvent industry best

practices.³³ The Commission must take great care to avoid depriving providers of innovations in network management that have contributed to lower rates for consumers, enabled a more robust communications system, and allowed legitimate emerging providers to offer innovative services to the public.

B. The Existing Safe Harbor Is Anticompetitive.

Given the substantial data collection and reporting obligations for originating providers under the Order, originating providers have strong incentives to avoid the associated burdens and unnecessary costs by qualifying for the existing Safe Harbor, although it is theoretically optional, and, as shown above, may in fact do little to improve call completion rates.³⁴ To avail themselves of the Safe Harbor, however, originating providers must drastically curtail their flexibility in managing their traffic delivery by restricting themselves to intermediate providers that themselves rely on no more than one additional intermediate provider.³⁵ Moreover, in addition to enshrining inferior traffic management arrangements, this Safe Harbor is anticompetitive.

It is hardly a revelation that, as a continuing legacy of the RBOC hegemony, only the largest ILECs have virtually ubiquitous interconnection arrangements with all RLECs. Thus, if an originating provider is to ensure that it qualifies for the Safe Harbor, the provider has virtually

³³ In contrast to the existing Safe Harbor, the HyperCube proposal focuses on weeding out bad actors and directly resolving call completion problems rather than arbitrarily and over-inclusively limiting the number of intermediate providers.

³⁴ See, e.g., n. 12, *supra*, and accompanying text.

³⁵ Indeed, an originating carrier seeking to implement the existing Safe Harbor must either use no intermediate providers, or otherwise certify that “all of its contracts with directly connected intermediate providers allow those intermediate providers to pass a call to no more than one additional intermediate provider . . . before the call reaches the terminating provider or terminating tandem.” See *Order*, ¶ 86.

no choice but to hand off its traffic either directly to a large ILEC or to an intermediate provider with an exclusive arrangement to deliver all its traffic to a large ILEC. Such an approach instantly forecloses those originating providers from taking advantage of alternative routing arrangements that may be just as, or even more, appropriate, both from the perspective of quality of traffic delivery and from the economic perspective. Ultimately, those competitive options could disappear along with the innovation that created them.

HyperCube has long advocated that the Commission promote increased, traffic-justified direct interconnection arrangements with RLECs to expand the available competitive options. In the Commission's *USF/ICC Transformation Proceeding*, HyperCube urged the Commission to establish as a standard, to be applied in state arbitration proceedings where the "rural carrier exemption"³⁶ is at issue, that the burden of proof shift to a rural carrier to demonstrate that a proposed direct interconnection arrangement was unduly burdensome economically and/or technically infeasible once the carrier requesting interconnection demonstrated that it had a volume of simultaneous traffic to exchange that would require minimum facilities with capacity equivalent to four T-1s,³⁷ regardless of underlying technology.³⁸ Direct interconnection

³⁶ 47 U.S.C. § 251(f)(1)(A)(ii) (2006).

³⁷ Having simultaneous traffic to exchange that would require facilities equivalent in capacity to four T-1s the *de facto* industry standard for determining that a proposed interconnection arrangement makes economic sense for both parties. See *In the Matter of Connect America Fund, A National Broadband Plan for Our Future, Establishing Just and Reasonable Rates for Local Exchange Carriers, High-Cost Universal Service Support, Developing an Unified Intercarrier Compensation Regime, Federal-State Joint Board on Universal Service, Lifeline and Link-Up, Universal Service Reform – Mobility Fund*, WC Docket No. 10-90, *et al.*, Comments of HyperCube at 5-9 (Feb. 24, 2012); Reply Comments of HyperCube at 5 (Mar. 30, 2012).

³⁸ See *e.g.*, *HyperCube Comments* at 5-9; *HyperCube Reply Comments*. Under HyperCube's proposal, costs of media conversion would be borne by the requesting carriers, so that RLECs not yet ready to convert from TDM to IP-based services would not be required to accelerate their network conversion expenditures.

arrangements reduce costs for intermediate providers,³⁹ offering increased network resiliency and diverse routings as alternatives to existing arrangements. They also alleviate network saturation situations for RLECs that may lead to call completion problems. Moreover, these new arrangements place market pressure on existing arrangements that imposes cost-discipline and ensure that RLECs are not captive to large ILEC arrangements.

The Commission has not yet addressed in earnest this pro-competitive “4 T-1” equivalent capacity proposal. However, if implementation of the existing Safe Harbor remains the only way originating providers can avoid the strictures of the new data collection and reporting requirements, it is unlikely that many intermediate providers will be able to acquire sufficient traffic volumes to take advantage of that proposal, even if the Commission adopts it. The result will be increased costs, fewer options, and further entrenchment of the dominant positions of the largest ILECs in the marketplace. This will be detrimental to efforts to accelerate the transition to IP-based services, by leaving emerging providers with few options for traffic delivery. This, in turn, will lead to increased costs for both providers and consumers, and deter market entry by providers interested in offering new services. Moreover, the largest ILECs are already attempting to impose unilaterally their self-serving IP interconnection arrangements on other providers, including RLECs and intermediate providers, and are urging the Commission to allow them to do so free of statutory restrictions and Commission oversight. The Commission’s Safe Harbor only strengthens the hands of the Nation’s most dominant providers.

³⁹ Costs of service would be reduced through establishment of such additional direct interconnection arrangements because ILECs’ tandem/transiting rates are not affected by the transitions to bill and keep adopted in the *USF/ICC Transformation Order*. See *Connect America Fund*, WC Docket No. 10-90, *et al.*, Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd. 17663, ¶¶ 1297-1314 (2011) (“*USF/ICC Transformation Order*” and “*USF/ICC Transformation FNPRM*,” respectively), *pets. for review pending sub nom. In re: FCC 11-161*, No. 11-9900 (10th Cir., argued Nov. 19, 2013).

Because of the unintended serious adverse effects on competition of the existing Safe Harbor, it is imperative that the Commission promptly implement one or more alternative Safe Harbor approaches.⁴⁰

IV. A COOPERATIVE MODEL FOR RESOLVING CALL COMPLETION PROBLEMS

As described above, HyperCube voluntarily undertook a study to determine whether it could identify and eliminate the sources of call completion problems through cooperation with terminating and other providers in the call flows. Based on that experiment, in the *HyperCube October 22, 2013, Ex Parte*, HyperCube outlined a cooperative industry approach to resolving such call completion problems in real time, which, if endorsed by the Commission, would provide an alternative Safe Harbor. This proposal is based on HyperCube’s determination that industry audit practices, such as examination of traffic volumes and patterns over retail services, can uncover the “bad” hops – the real cause of call completion problems – when providers in the call path cooperate to identify and resolve them. Importantly, this approach not only targets the real problems but also is free of the anticompetitive effects of the existing rules, interim waiver, and Safe Harbor.

A. Summary of the Cooperative Call Completion Resolution Proposal

HyperCube therefore proposes, as an alternative Safe Harbor⁴¹ for participating service providers, the establishment of an industry alert and response system to address specific call

⁴⁰ While the Commission also has stated that originating providers adhering to a set of industry “best practices” may request waivers of data collection and reporting requirements, *Order* at ¶ 96, the Commission has sought comment on additional procedure (*Order* at ¶¶ 95-96, *FNPRM* at ¶¶ 124-127), the lengthy and uncertain waiver process is far from the equivalent of a formal Safe Harbor exemption. The currently available interim waiver from data retention requirements for certain originating providers is, moreover, tied to compliance with the existing Safe Harbor obligations.

completion problems as they arise.⁴² Notifications would be provided via a public, Internet-based message board and associated listserv (the “Alert Service”), which would be established through voluntary industry efforts. Once this has been organized, participating industry members could voluntarily subscribe to the Alert Service.⁴³

An RLEC or interconnected VoIP (“IVoIP”) provider experiencing a rural call completion problem would use the Alert Service to notify participating providers. The Alert would provide sufficient information to allow other providers in the call flow to determine whether their networks were experiencing problems in completing calls to the notifying provider, as well as provide contact information for use by responding providers. Participating providers would then review their traffic records to determine if they were terminating traffic in the affected area and, if so, would determine if there was evidence of anomalous routing arrangements. Affected providers then would contact the notifying RLEC or IVoIP provider to share information and work with the notifying provider and other providers in the call path to determine whether improper arrangements were contributing to the problem, or if there could be

⁴¹ See Comments of ATIS, at 6-7 (May 13, 2013) (recommending that the FCC “also consider whether there may be other measures carriers can take that should constitute safe harbors”). See also *FNPRM* at ¶ 125 (soliciting comment on modifications of the existing Safe Harbor and suggestions for additional Safe Harbor approaches).

⁴² In the *Order*, the Commission encouraged continuing industry cooperation to address call completion problems, stating “some providers have devoted substantial time and resources to analyzing rural call completion performance. We applaud these and other efforts by stakeholders and encourage the continued support of the industry to undertake further efforts to diagnose problems in call routing, cooperate on finding solutions, and adopt best practices aimed at solving the rural call completion problem.” *Order* at ¶ 12. If adopted, HyperCube’s proposal would formalize such an approach.

⁴³ Providers would be free to subscribe and unsubscribe to subsets of data on the basis of LATAs, states, or other similar data identifiers.

a need for the RLEC or IVoIP provider to augment its facilities.⁴⁴ The posting of Alerts reporting call completion problems also would provide more quickly information that the Commission seeks in its mandatory reports.⁴⁵ HyperCube believes that implementation of this system would be a highly effective means of expediting resolution of rural call completion problems, and thus of providing substantial benefits to the public.

By subscribing to this Alert Service, a provider would commit to making commercially reasonable efforts to determine whether a reported call completion issue affected its call flows and in the event that it did, to address and help resolve the issue. In addition, subscribing providers would be required to maintain logs identifying the geographically relevant Alerts which they had investigated and the accompanying responses.

Every carrier and IVoIP provider that committed – and continuously fulfilled its commitment – to utilize the Alert System would be entitled to a Safe Harbor exemption from the rural call completion record retention and reporting requirements. Thus, the participation logs will be essential to determining a provider’s eligibility for the Safe Harbor. Providers would need to file only an annual certification of participation (or continued participation) in the Alert System. If a provider ceased to fulfill its commitment to investigate problems and cooperate in efforts to resolve call completion issues, it would lose its Safe Harbor exemption.

⁴⁴ See Attachment 1 (describing a situation involving a back-door Internet termination route, where it became clear that there also were insufficient RLEC facilities once the back door was closed).

⁴⁵ Some of this information also could be relevant to the work of the FCC’s Enforcement Bureau. *Cf. Order* at ¶ 7 (discussing the Declaratory Ruling, 27 FCC Rcd. 37 (2012), finding that call blocking and other activities could be unlawful). See also *Order* at ¶ 27 (noting the Enforcement Bureau’s interest in collecting information relating to “specific complaints and enforcement actions”).

B. Benefits of Implementing the Proposal

HyperCube recommends that the Commission adopt the proposal as an alternative Safe Harbor because of its multiple inherent benefits. HyperCube believes that implementation of this pragmatic proposal would be highly effective at eliminating call completion problems without the risks created by rules and Commission-endorsed practices that would ultimately reduce the number of competitive network-routing options.

As demonstrated by the HyperCube study, implementation of the proposal promises to allow RLECs and IVoIP providers experiencing call completion problems to benefit from the investigation of the call flows by other participating providers, and thus to resolve the issues immediately. Additionally, “bad actors” will be on notice that there will be more vigilant traffic monitoring, giving the program a deterrent effect. RLECs and IVoIP providers also will be able to determine if there is a previously unknown need to augment their facilities. Such prompt remediation is of substantial benefit to their customers, as well as to the providers.

Further, rather than requiring scarce provider human and financial resources to be devoted to data collection and reporting, which may be of questionable utility and raise concerns about protection of proprietary information, implementation of this focused proposal directs those resources toward resolving identified call completion problems. RLECs would have an important role,⁴⁶ and, because they would be employing their resources to directly address their immediate problems, they would be more likely to participate than they would in an optional data collection effort.

⁴⁶ As HyperCube’s first case study revealed, unless the affected RLEC participates in remediation efforts, problems cannot be corrected, especially where problems are the result of insufficient RLEC facilities as well as unauthorized routings. *HyperCube July 22, 2013, Ex Parte*, Slide 1.

Moreover, because the proposal is essentially self-effectuating, its implementation would minimize the level of routine Commission oversight and enforcement, freeing Commission resources to concentrate on problem situations and other matters. At the same time, the Alert Service would provide the Commission with very specific information about call completion problems.

Finally, rather than being anticompetitive and eliminating provider and consumer options, this Safe Harbor would be pro-competitive, encouraging the development of new intercarrier relationships and potentially leading to an increase rather than a reduction in routing arrangements. This would lead to greater network diversity and resilience, as well as impose market discipline on the pricing of the largest ILECs.

CONCLUSION

The HyperCube proposal replaces data collection and studies with pragmatic problem-solving. It promises to reduce and expedite resolution of call completion problems that frustrate and harm consumers and deprive RLECs of needed revenues to which they are entitled. The Commission should adopt this proposal as an alternative, pro-competitive Safe Harbor that

would relieve originating providers from the burdens of data collection and reporting by allowing them to focus their resources on the resolution of call completion problems in real time.

Respectfully submitted,

/s Helen E. Disenhaus

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ATTACHMENT 1



Case Study #6 (New)

Texas RLEC

Vendor Rate (average): \$0.0013

RLEC Tariff Rate (access composite): \$0.0053

Low-Cost Vendor CCR at Busy Hour: 48% NER

Access Tandem Interconnection: 93% NER

CCR at Quiet Hour: 99% NER for all vendors

Tentative Conclusion: RLEC network issues and an Internet-based call-termination backdoor into the RLEC network were key causes.

Disposition: The backdoor was closed, resulting in a drop in NER from 93% to 81% pending facilities augments necessitated by legitimized traffic demand.

